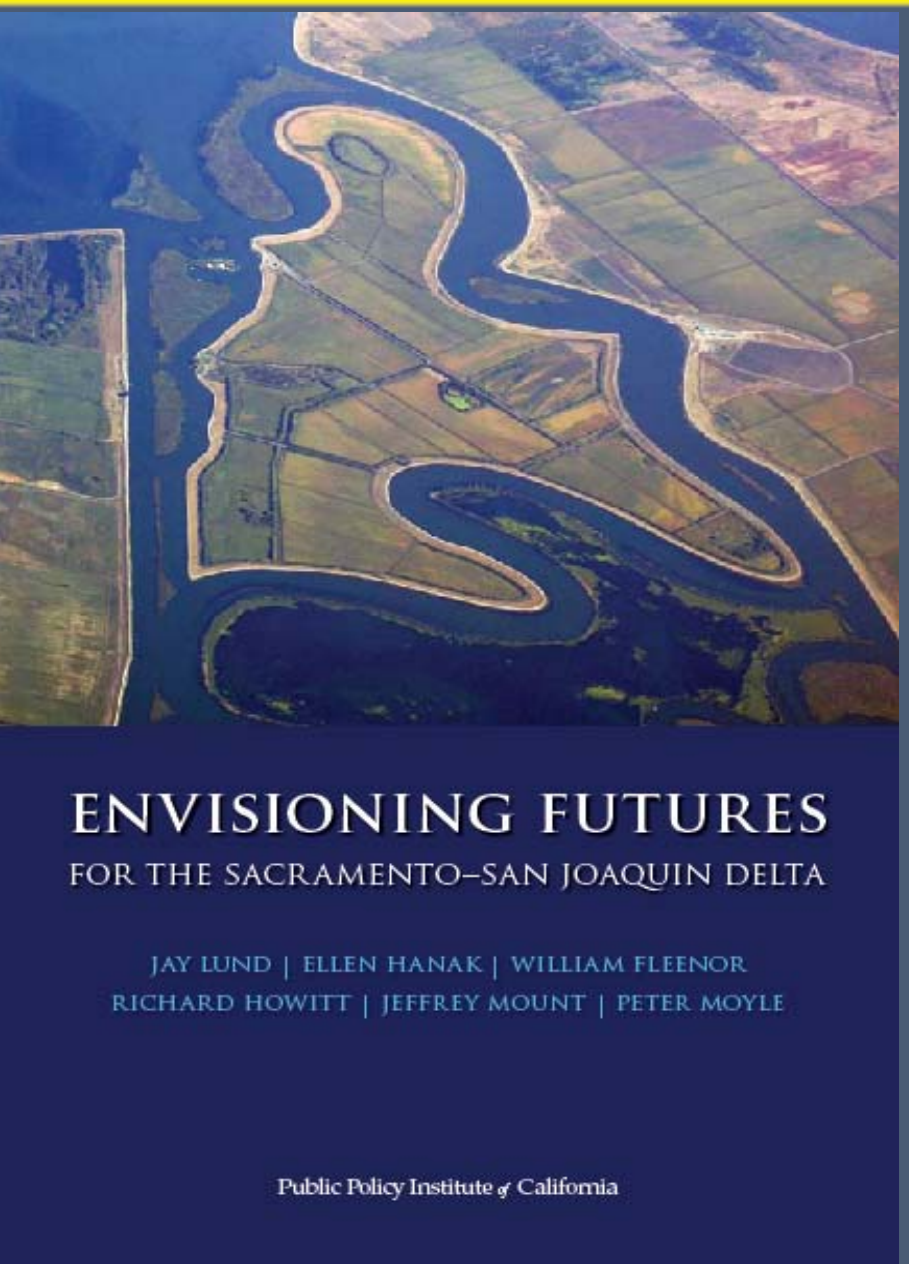
Envisioning Futures for the Delta



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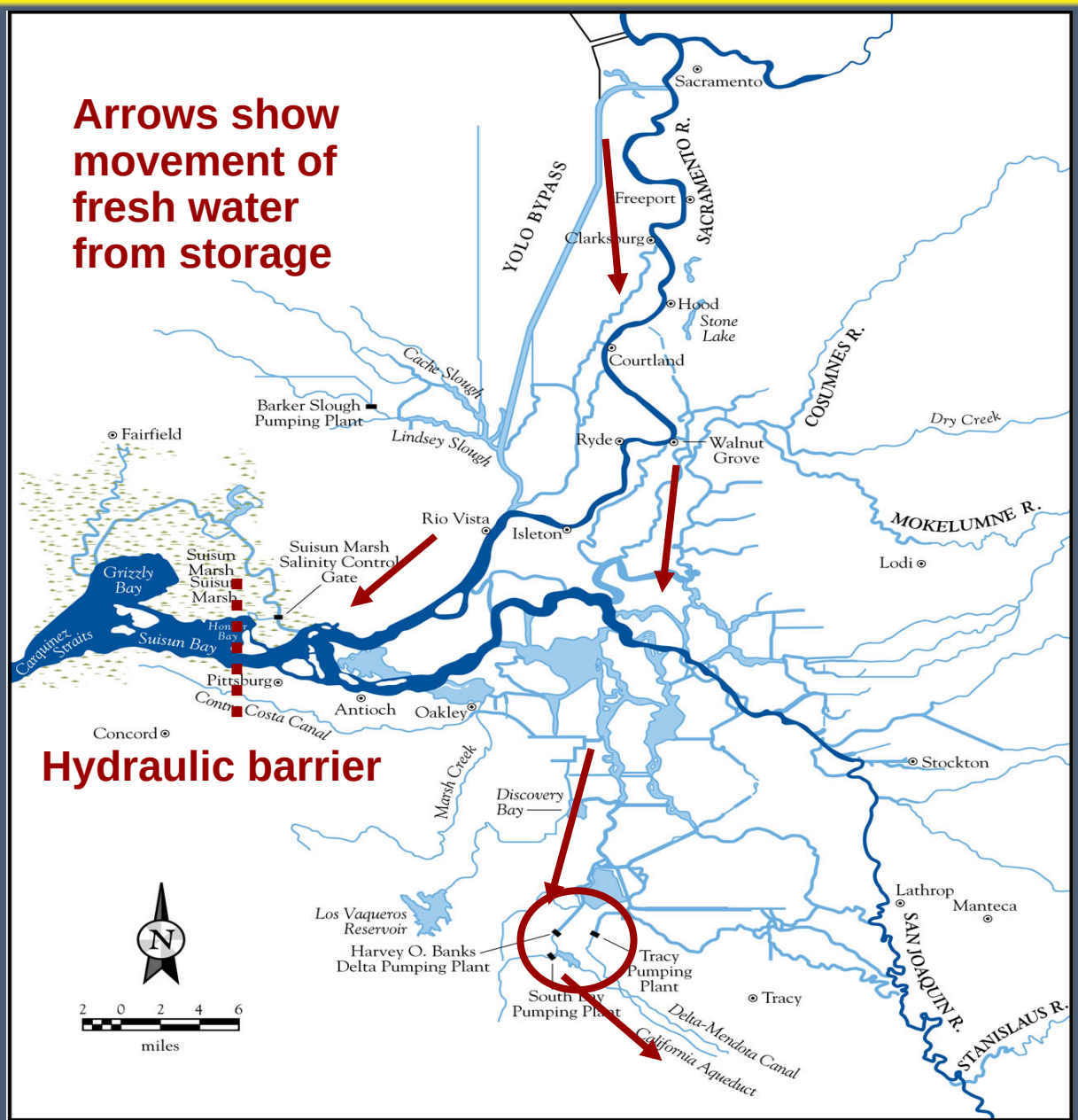
Why We Need a New Delta Policy

- Existing Delta policy is unsustainable
  - All interests are getting worse together
- Delta failure would be disastrous for state, regional, and local interests
- Better ecosystem understanding points to promising new solutions
- Stakeholders can better adapt to new solutions than continue with the current high-risk policy
- Promising alternatives exist

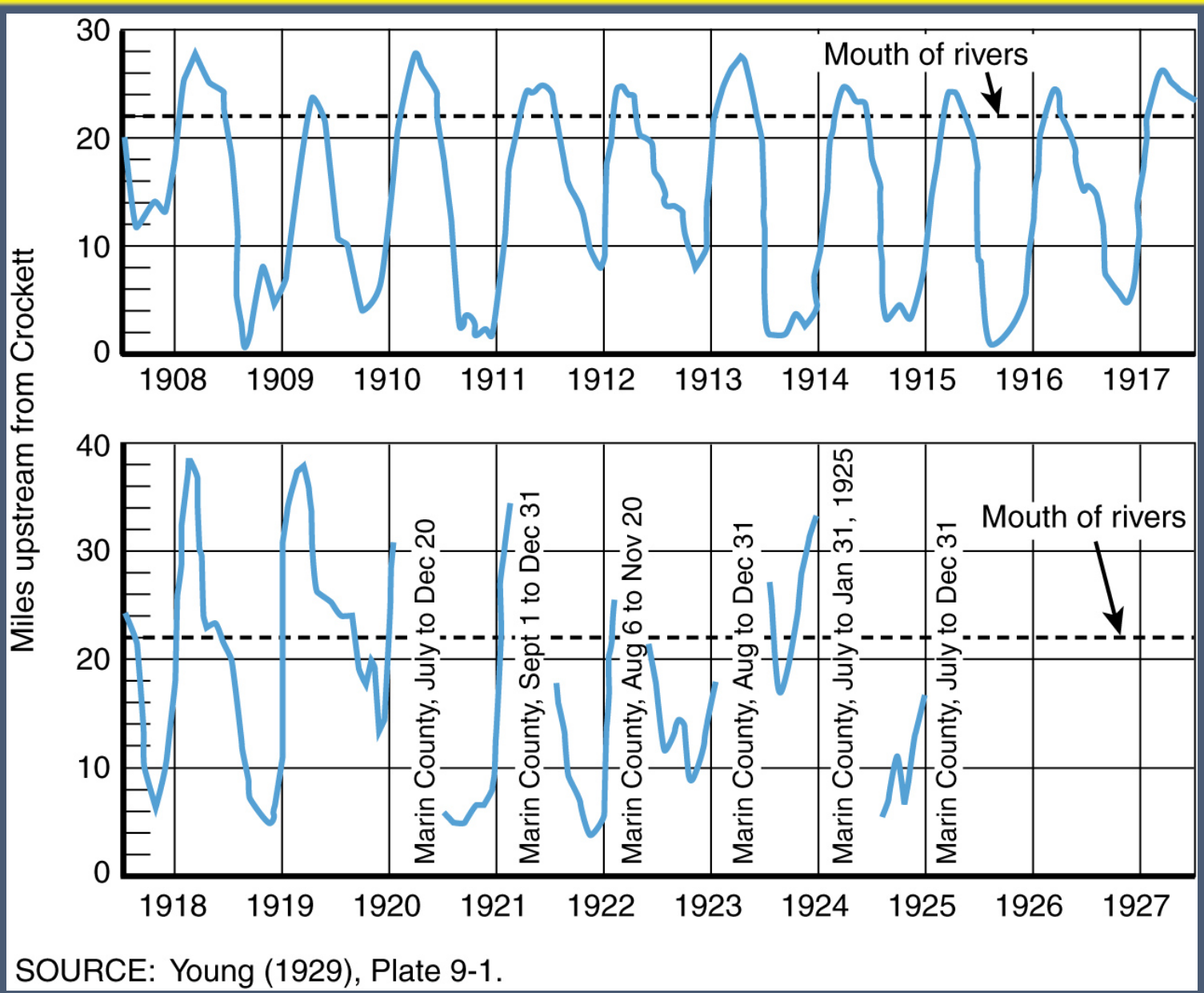
Outline

- New thinking: ecosystem and adaptation
- Some long-term alternatives
- Screening of alternatives
- Recommendations

Since 1940s, We Have Been Managing Flows to Keep the Delta Fresh



Historically, Delta Salinity Fluctuated



SOURCE: Young (1929), Plate 9-1.

Static, Freshwater Delta Not Good for Native Species

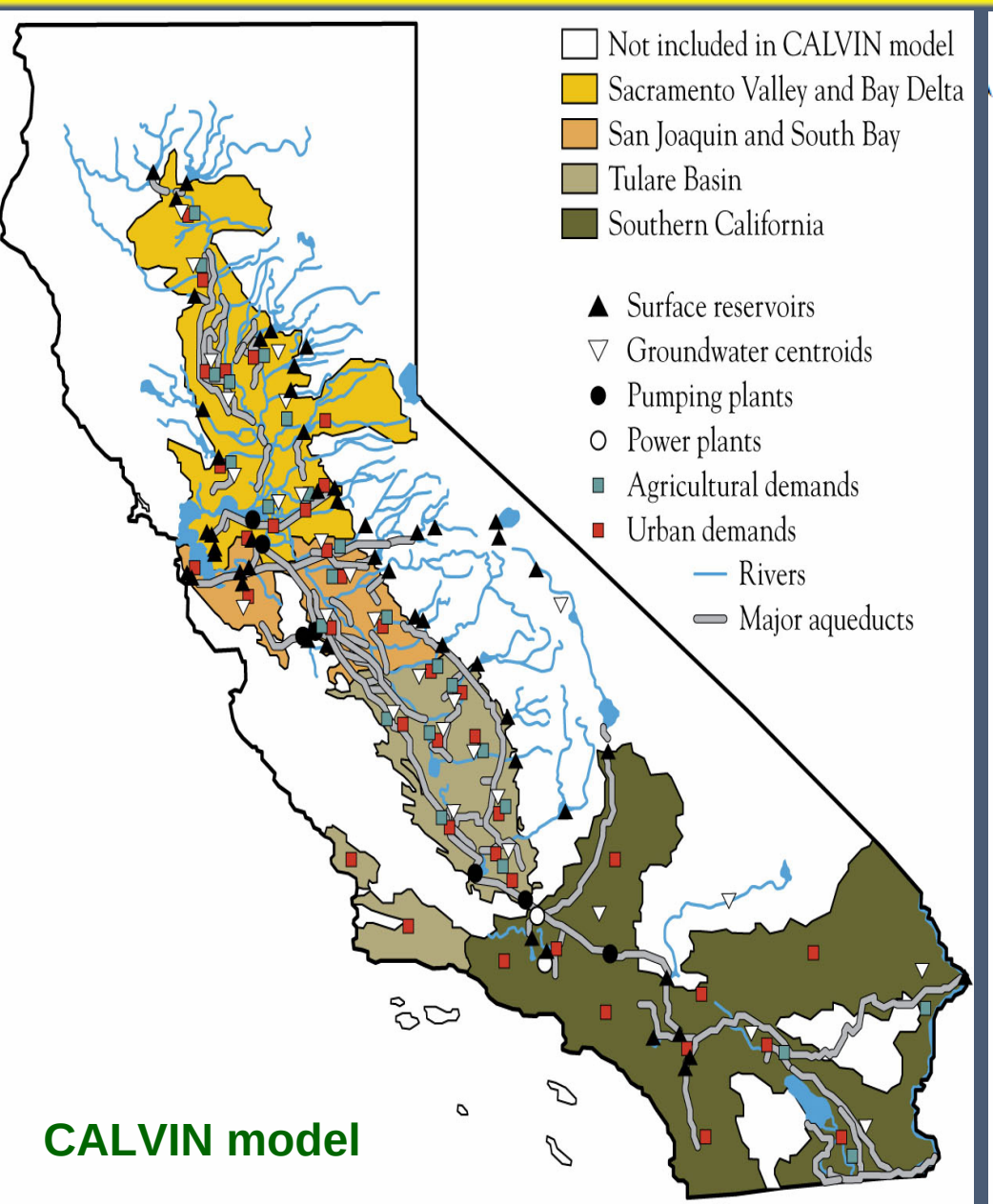
- Native species evolved in a fluctuating Delta
- Alien species have taken hold and harm native species
- Alien species do best with constant salinity (fresh or saline)
- Restoring (or increasing) fluctuating conditions may be key to native species' survival

Asiatic clam

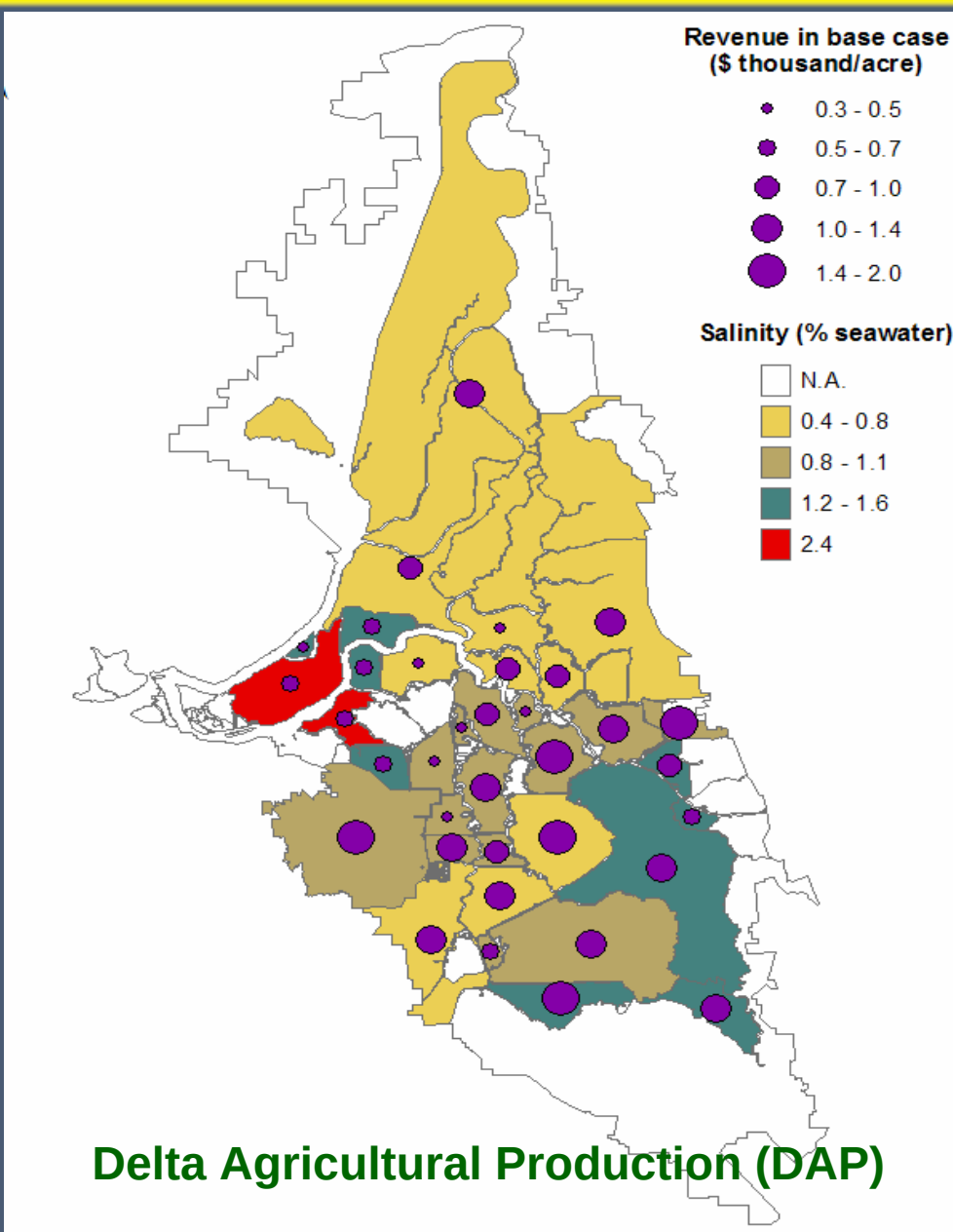
Brazilian waterweed

Overbite clam

Statewide and Delta Models Used to Assess Costs of Policy Changes



CALVIN model



Delta Agricultural Production (DAP)

Adaptation Will Occur

- Adaptation is unavoidable, since the current Delta is unsustainable
- All interests can adapt to some policy changes
- Available tools for urban and farm sectors
  - New interties, water marketing, conservation
  - Conjunctive use, recycling, desalination
  - Shifting crop mixes
- Economic costs are finite, but can be large for some users

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Nine Delta Alternatives

- **Freshwater Delta**
  - **Two levee-based alternatives**
  - **Physical salinity barrier**
- **Fluctuating Delta**
  - **Two peripheral canal alternatives**
  - **Armored-island aqueduct**
- **Reduced-exports Delta (also fluctuating)**
  - **Opportunistic Delta**
  - **Eco-Delta**
  - **Abandoned Delta**

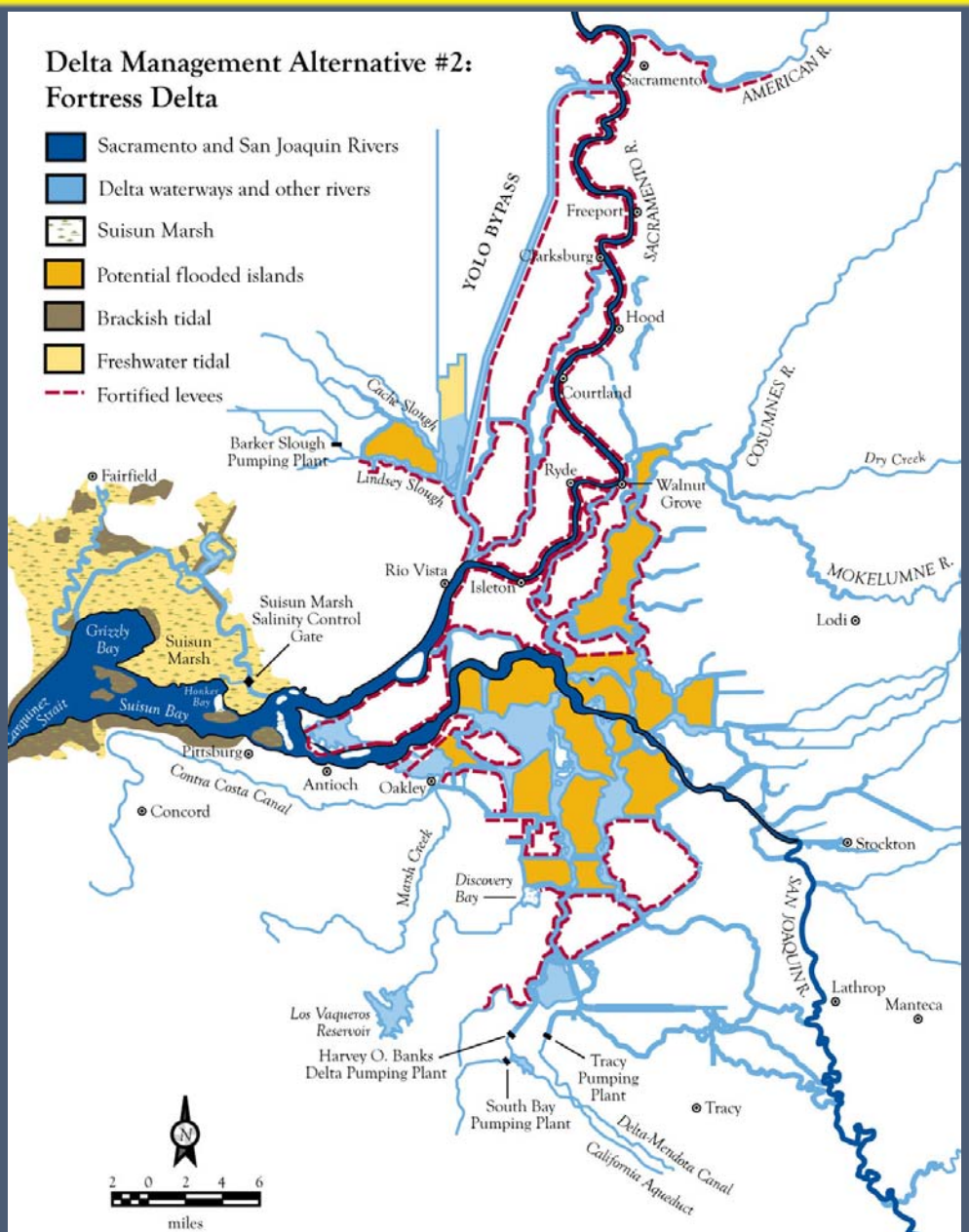
1) Levees as Usual: Enhancing Current Levee System, Keeping Delta Fresh

- Status quo, with improvements
- Maintains current land uses
- Increasing risks of failure

Sacramento River levee

2) Fortress Delta: Dutch Standards of Flood Protection – A Big Jump

- Keeps Delta fresh
- Strategic levees become much more reliable
- Aids urbanization
- But many islands lose protection



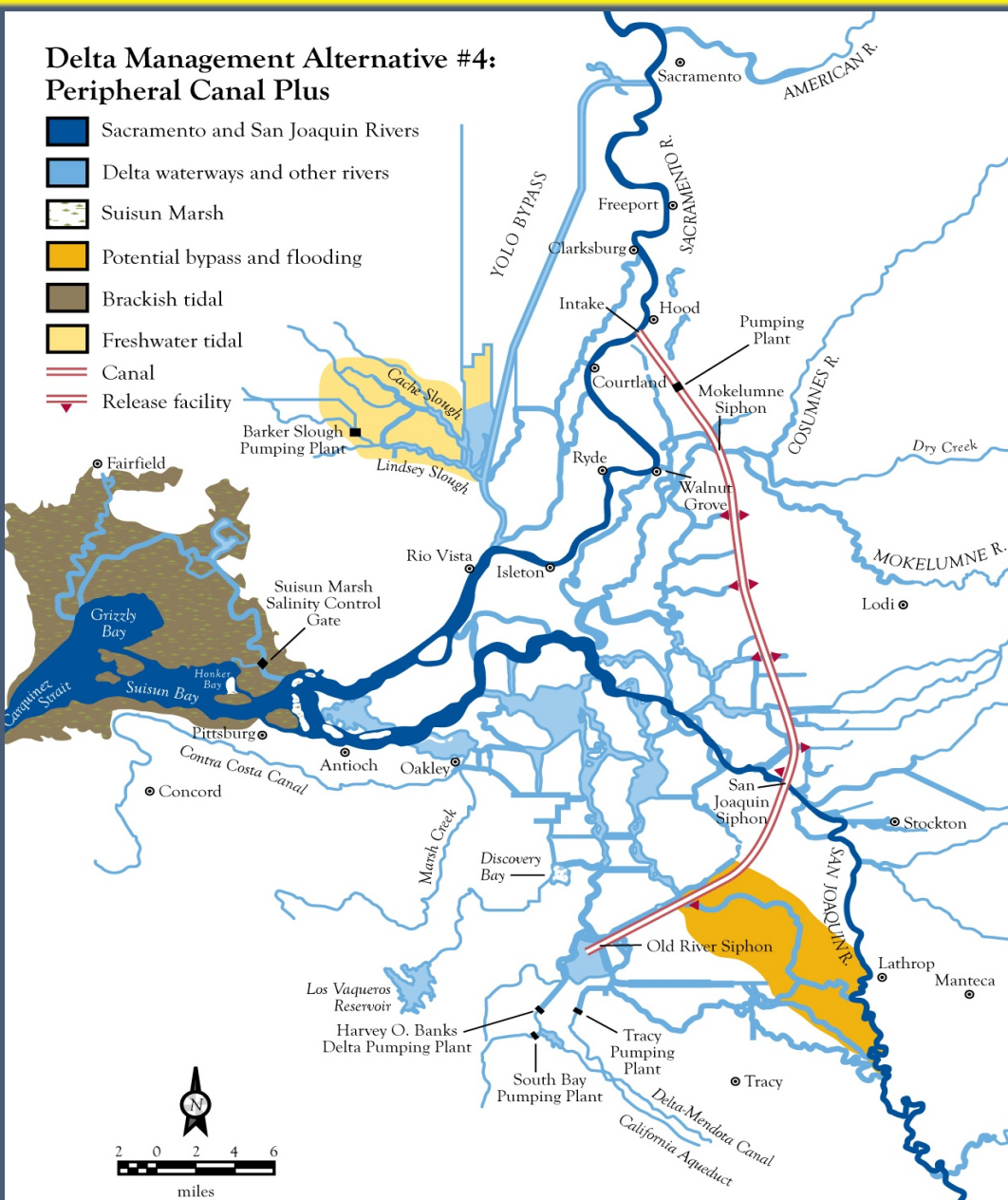
3) Seawater Barrier: Dutch Engineers Have Recently Revived This Solution

- Prevents seawater intrusion…
- …but not island flooding or other issues

Rotterdam movable storm surge barrier

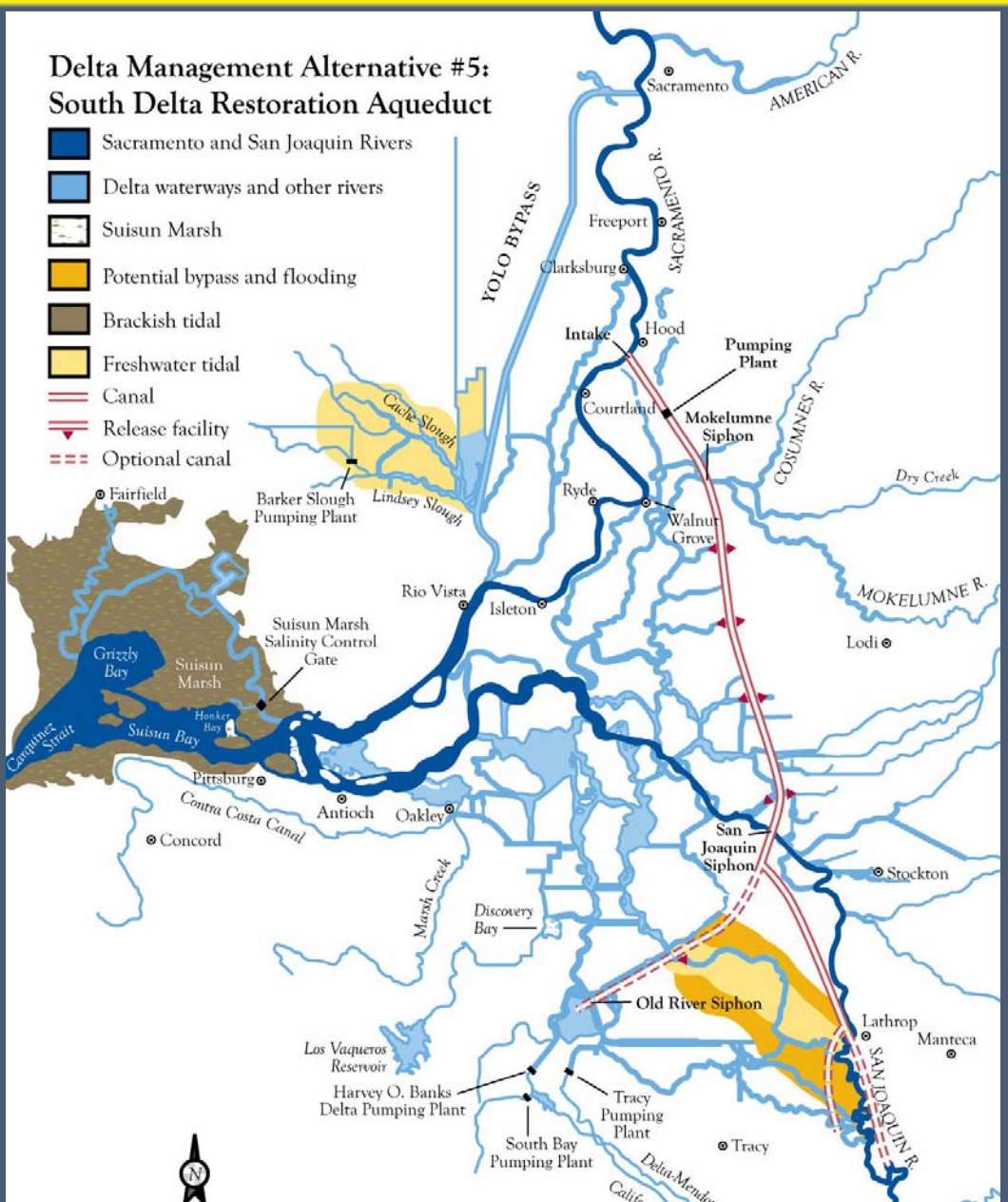
4) Peripheral Canal Plus: Update of a Traditional Idea

- Breaks link between exports and Delta water quality
- Adds ecological management actions
- Lower San Joaquin bypass, floodplain



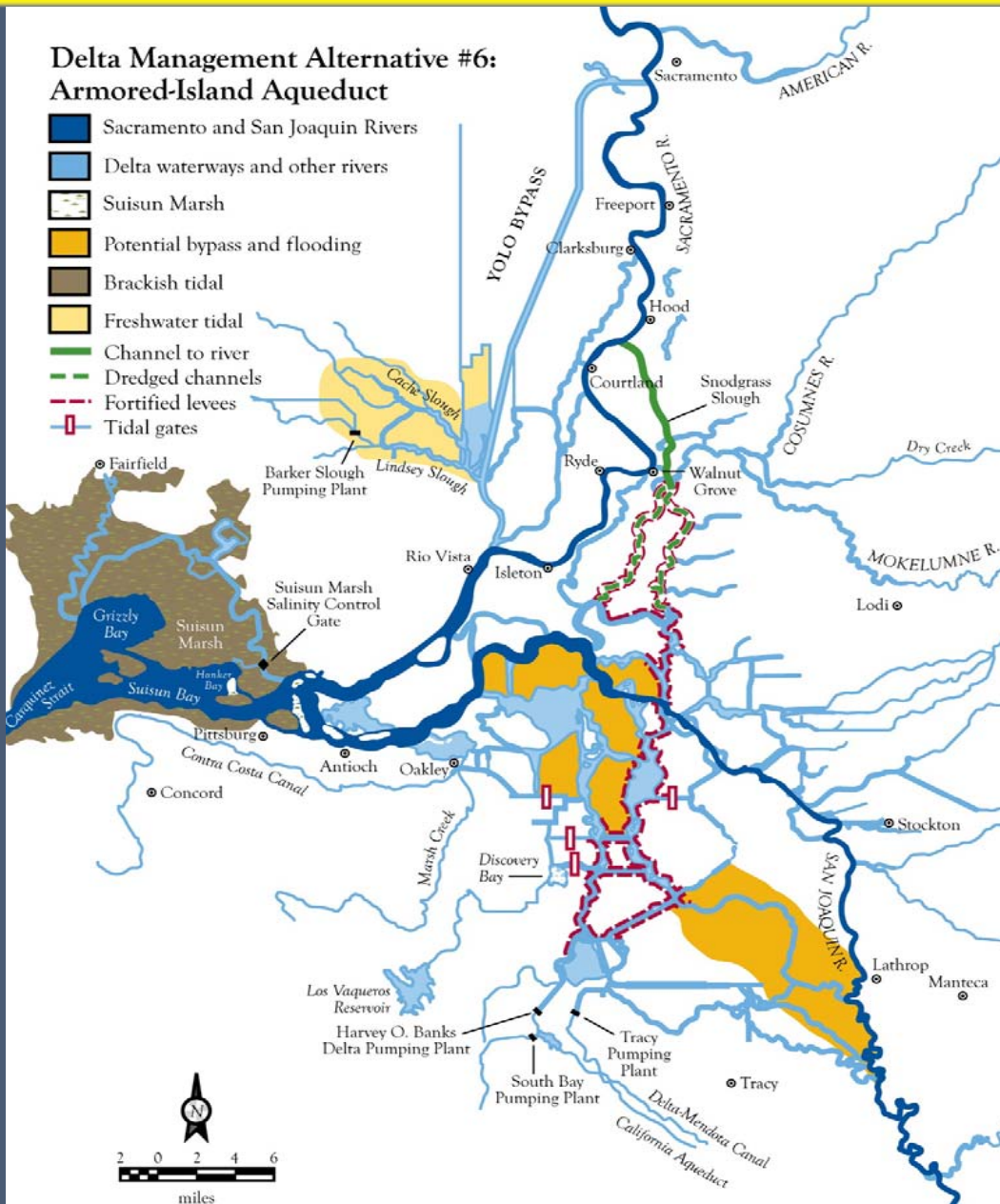
5) South Delta Restoration Aqueduct: A New Peripheral Canal Idea

- Improves South Delta and lower San Joaquin River water quality
- Ends numerous South Delta water quality programs
- Lower San Joaquin flood bypass for flood control and ecosystem benefits



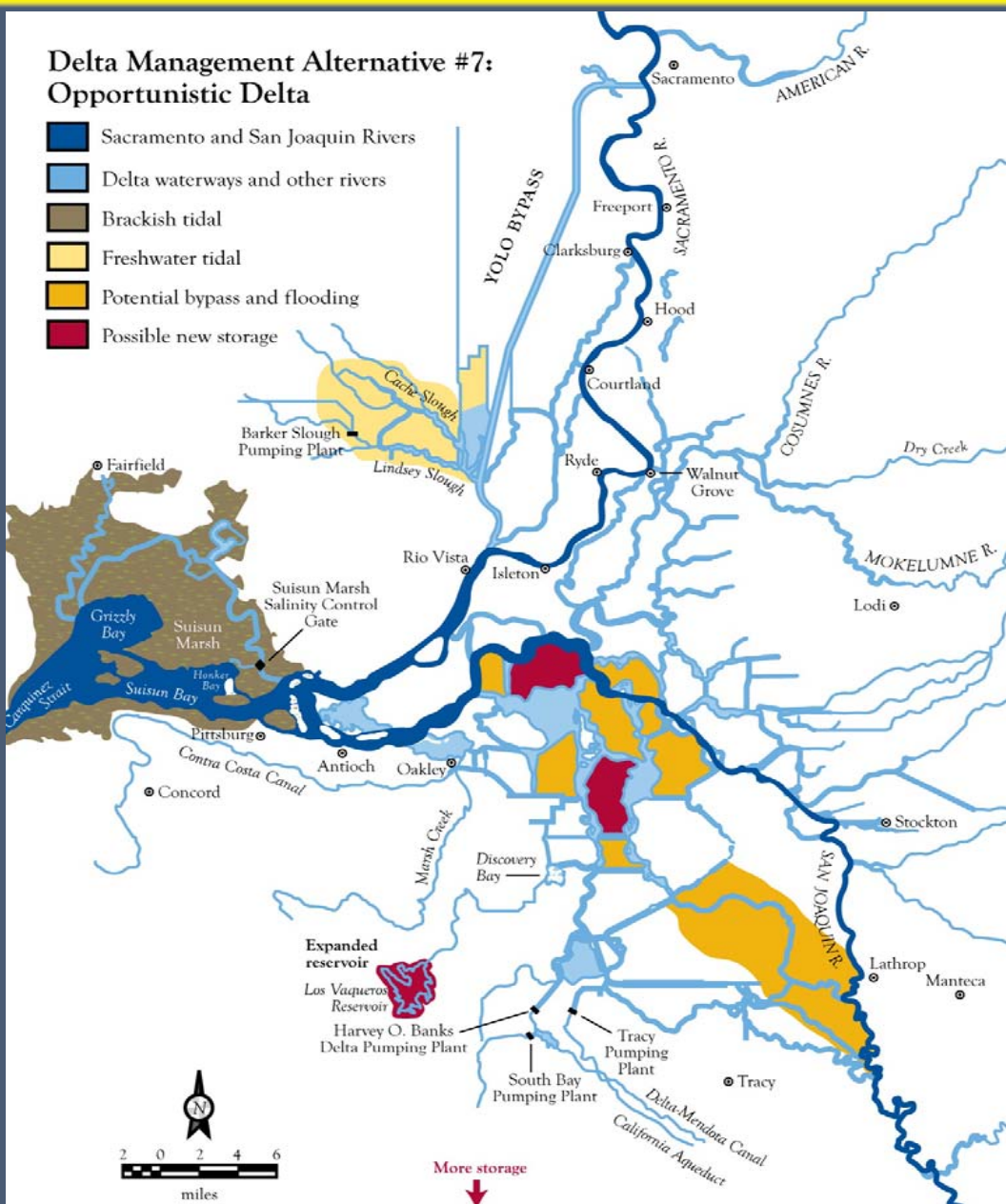
6) Armored-Island Aqueduct: A Through-Delta Solution

- Armor main channels, close others to maintain conveyance
- Keeps eastern Delta fresh
- Allows western and central Delta to fluctuate



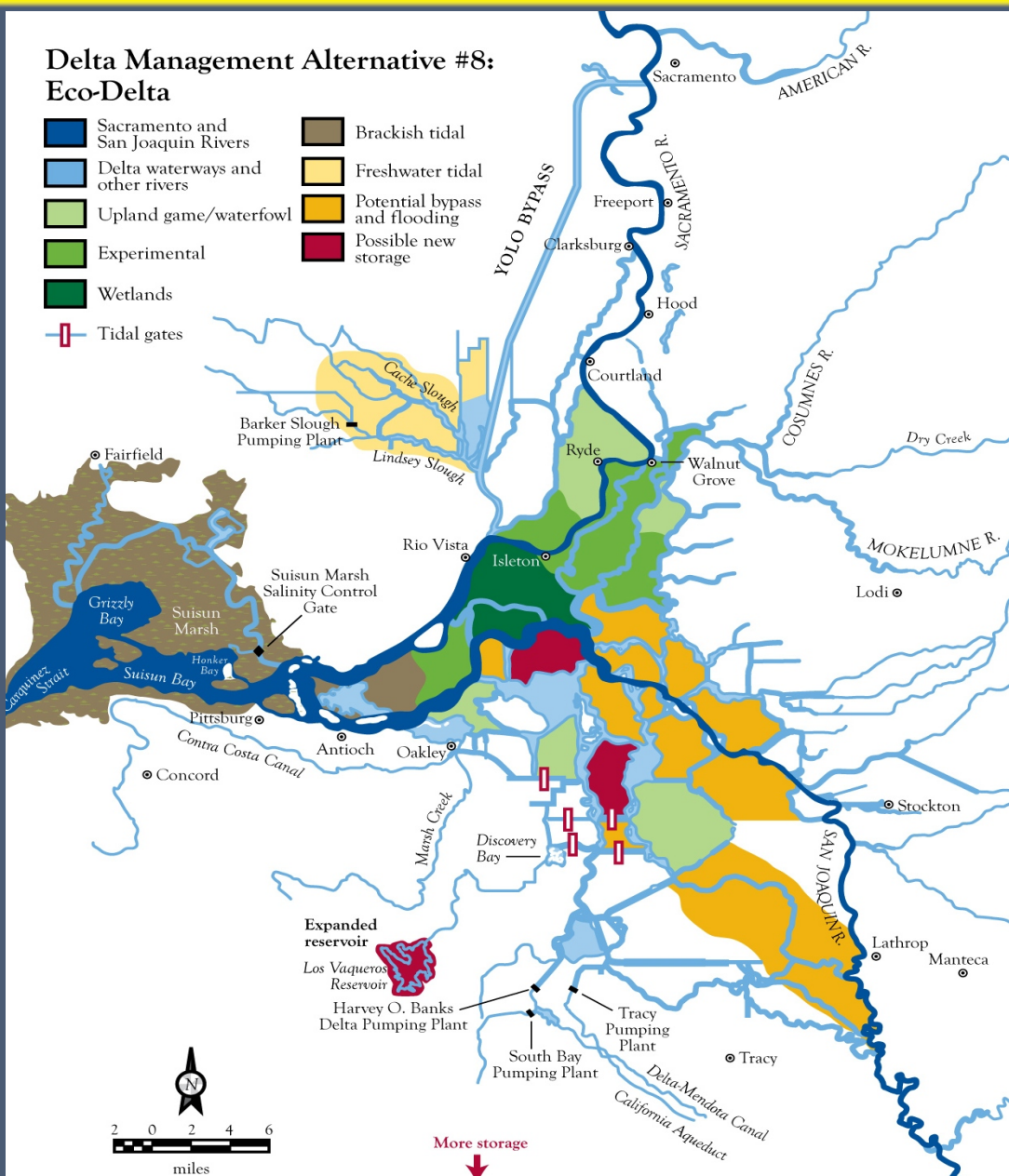
7) Opportunistic Delta: Restores More Natural Fluctuations

- Uses current export locations, pumping is opportunistic
  - 2-8 maf/year
- Adds near-pump storage



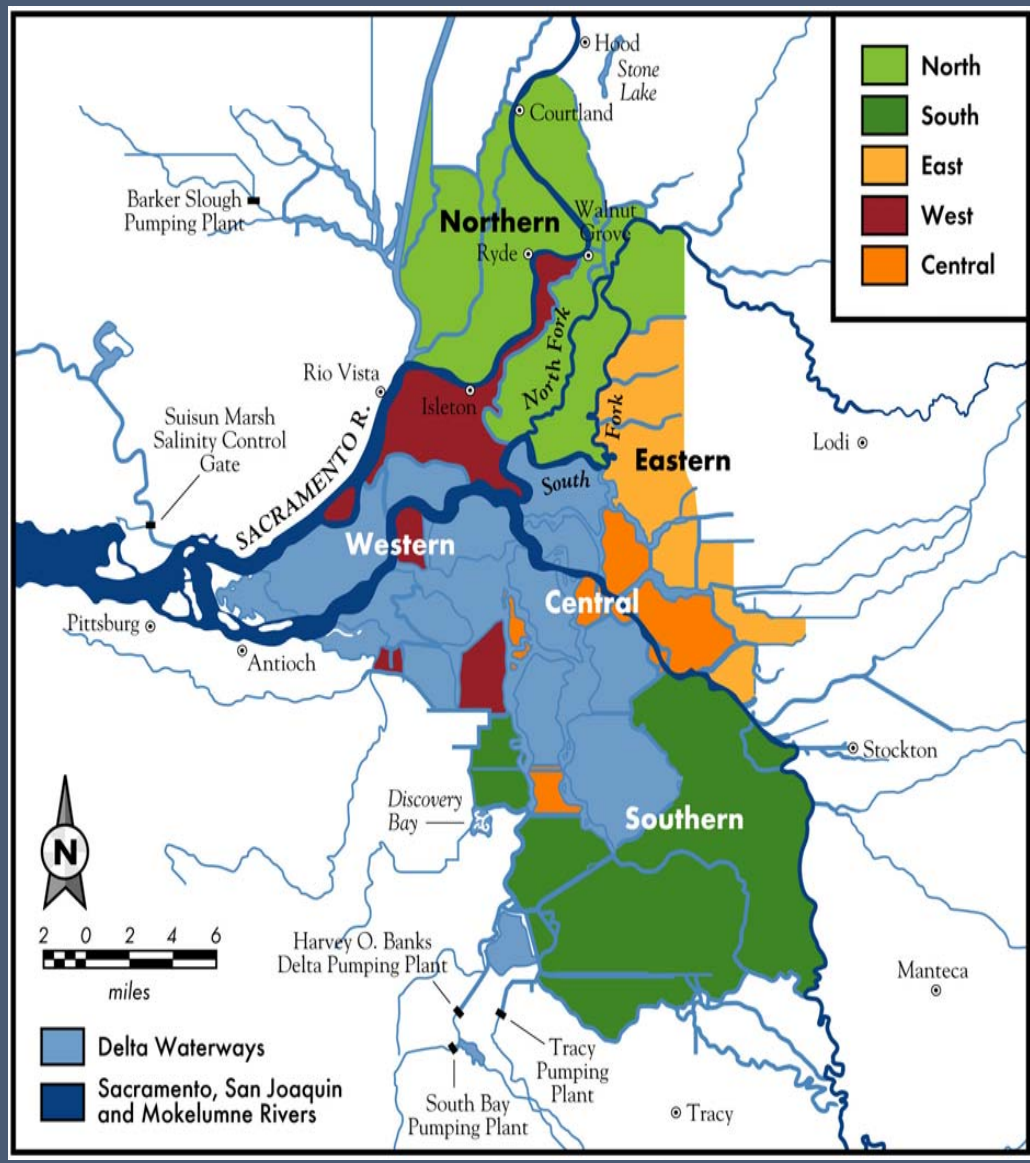
8) Eco-Delta: An Example of Local Specialization

- Allows opportunistic pumping, but at lower levels
  - 1-5 maf/year
- Specialized restoration of islands, bypasses



9) Abandoned Delta: Letting Nature Take its Course

- Abandon an unreliable resource
- 2-in-3 probability of abrupt change from earthquake or flooding
- End of water exports
- End of ecosystem investments



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Screening Criteria

- Ecosystem performance (conceptual model)
- Water exports (CALVIN)
- Economic and financial costs
  - Delta agriculture and salinity (DAP)
  - Costs of export adaptations (CALVIN)
  - Investment costs (existing studies)
- Other Delta services (qualitative)

Fluctuating Delta Alternatives Are Most Promising

Alternatives	Environmental Performance	Annual Water Exports	Economic and Financial Costs
1. Levees as Usual	Poor	0 – 6+ maf	~$2 Billion + failures
2. Fortress Delta	Poor	6+ maf	> $4 Billion + lost islands
3. Saltwater Barrier	Poor		$2 – 3 Billion + lost islands
4. Peripheral Canal Plus	Promising - allows Delta to fluctuate		$2 – 3 Billion + < $70 M/year
5. South Delta Aqueduct			$2 – 3 Billion + < $41 M/year
6. Armored-Island Aqueduct	Mixed		$1 – 2 Billion + < $30 M/year
7. Opportunistic Delta	Promising	2 – 8 maf	$0.7 – 2.2 Billion + < $170 M/year
8. Eco-Delta	Best?	1 – 5 maf	Several $ Billion + < $600 M/year
9. Abandoned Delta	Poor	0	$500 Million + ~$1.2 Billion/year

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“No Regrets” Short-term Actions

- Emergency preparedness
- “Do not resuscitate” list for some islands
- Delta land use
  - Flood control guidelines for urbanization
  - Habitat protection
- Suisun Marsh and Cache Slough projects for pelagic fish

Aspects of a Long-term Solution

- Focus on promising alternatives
- Begin a Delta Solutions Program – problem-solving R&D
- Enhance regional and statewide representation in Delta land use decisions (e.g. SF BCDC)
- Require up-front funding commitments from beneficiaries
- Establish mitigation mechanisms – everyone will *not* "get better together"

Delta Ideas: Old and New

Old Idea	New Idea
1. The Delta is unchanging.	The current Delta is temporary. Sea level rise, land subsidence, and levee failure doom today's Delta.
2. More fresh water is better for the Delta ecosystem.	Variability and fluctuation are important for a healthy ecosystem.
3. Delta users cannot adapt to change.	Delta users can adapt to change, and have no alternative.
4. Incremental changes will solve the Delta's problems.	Major changes are needed in Delta policy.
5. State and federal taxpayers will pay to keep the Delta as it is.	State and federal funds are limited. Beneficiaries must and should pay; they will pay more if the Delta fails.

Narrowing the Alternatives: Delta Solution Insights

- Technical insights to inform Delta Vision, BDCP
  - Short time horizon (by late 2007, early 2008)

- Commission expert panel reports
  1. Focused comparisons of promising alternatives
  2. Institutional options for long-term Delta management and finance
  3. Delta environmental management
  4. Variability for the Bay-Delta system

Delta Solutions Program: Medium-Term

- Needed follow-on to Delta Vision decisions
- Technical group to suggest promising solutions
- Multi-year effort; must start now
- Initial technical effort
  - Desirable ecological conditions
  - In-Delta solutions (islands, levees, habitat,…)
  - Export solutions (conveyance, screens,…)
  - Institutions (economics, finance, assurances)
  - System integration and operations

Questions?

- **Full report, research brief, and other materials at: www.ppic.org and watershed.ucdavis.edu**